

26. The combustion system of claim 25 further comprising a flame sensor that communicates with the exiting gas and provides flame rectification of the burning gas and works in combination with the means for feeding gas to improve combustion.

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the amendments and the following remarks.

Claims 1, 5 and 6 have been amended; new Claims 19-26 have been added. Claims 1-11 and 19-26 are presented for prosecution on their merits.

I. SUMMARY OF OFFICE ACTION

The Examiner acknowledged Applicant's election with traverse of the Group I claims (i.e., Claims 1-11) in Applicant's Response to Restriction Requirement mailed April 3, 2002. The Examiner deemed that the Restriction Requirement was proper and, therefore, made the requirement final. In accordance with the above determination, the Examiner withdrew claims 12-18 (i.e., the Group II claims) from further consideration pursuant to 37 CFR § 1.142(b) as being drawn to a non-elected invention.

The Examiner objected to the disclosure because of minor informalities due mainly to typographical errors.

The Examiner rejected claims 5 and 6 under 35 U.S.C. § 112 because, in the Examiner's opinion, the phrase "or the like" renders the scope of the claims unascertainable.

The Examiner rejected claims 1-6 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 460,054 to Rhind.

The Examiner rejected claims 7-9 under 35 U.S.C. § 103(a) as being unpatentable over Rhind.

(It should be noted that the Examiner failed to set forth an express reason in the outstanding Office Action for rejecting Claims 10 and 11.)

II. SUMMARY OF APPLICANT'S INVENTION

Applicant's invention comprises an improved combustion system for use in a gas burning heater. Applicant's combustion system comprises primarily three elements; namely, a circularly-shaped burner tube, a first conical frustum section attached to the burner tube, and a second conical frustum section attached to the burner tube.

The tube has a plurality of gas exit holes on one side. The ends of the conical frusta sections that are attached to the tube straddle the gas exit holes. The first conical frustum section flares inward with respect to the radial direction of the tube, and the second conical frustum section flares outward with respect to the radial direction of the tube.

III. DISCLOSURE OF U.S. PATENT NO. 460,054 TO RHIND

U.S. Patent No. 460, 054 discloses a gas burner that includes three radial gas-supply arms 3 that have ducts in their center and connect to a ring 3a having a circular channel which communicate with the ducts of the arms, an annular chamber 4 formed from a cylindrical wall 6 and a cylindrical inner wall 7. The cylindrical walls 6, 7 have a top 5a provided with jet-apertures 5. (See Rhind lines 35-50.) The gas burner disclosed in the '054 patent also includes an inner shell 9, an outer perforated shell 10, a conically-shaped outer perforated thimble 12 that is fixed to a concentric ring 13, an inner perforated thimble 14, and an air distributor consisting of a perforated hanging shell 16 and a centrifugal disk deflector 17. An additional annular shell 18 defines annular chamber 15.

IV. REPLY TO OFFICE ACTION

A. The Rejections Based on Art

A rejection under Section 102 requires that the anticipatory patent place the claimed invention into the public domain. Since all patents must describe and enable an invention to one skilled in the art, an anticipatory patent, by definition, must disclose each and every element of the claimed invention. Clearly, Rhind does not disclose each and every element of the claimed invention and, therefore, cannot anticipate Applicants' invention.

Just a cursory review of the Rhind patent would reveal that Rhind requires eight major aperture elements, including a top 5a, an inner shell 9, an outer perforated shell 10, a conically-

shaped outer perforated thimble 12, an inner perforated thimble 14, a perforated hanging shell 16, a centrifugal disk deflector 17, and an additional annular shell 18. In contrast, Applicant utilizes two air-controlling conical frusta. This would immediately convey to one skilled in the art that Rhind cannot possibly describe and enable Applicant's burner, and therefore cannot anticipate Claims 1-11 and 19-26 of Applicant.

Moreover, of the aforementioned eight elements, Rhind discloses three spherically-shaped aperture elements, two flat aperture elements, one conical aperture element and two conical frustum-shaped aperture elements. Rhind's conical (i.e., inner perforated thimble 14) and two conical frustum-shaped elements (i.e., outer perforated thimble 12 and perforated upper shell 9) all converge in the same direction (i.e., they narrow as the distance from the bottom or gas source increases in the Rhind burner). Applicant's first conical frustum converges inward as the distance from the burner tube increases, while the second conical frustum diverges as the distance from the burner increases. Rhind does not disclose a single converging conical frustum and, does not disclose or suggest a diverging conical frustum. Accordingly, Rhind not only fails to anticipate Applicant's claimed structure, it fails to suggest Applicant's claimed structure; therefore, Rhind cannot make obvious Applicant's Claims 1-11 and 19-26.

In addition, Rhind does not disclose Applicant's circularly-shaped burner tube having a plurality of gas exit holes on one side. Rhind states that the arms 3 and ring 3a supply gas to the annular chamber 4; however, neither the drawings nor the description of Rhind disclose how this is accomplished. Figure 3 shows the top view of the arms 3, but does not show any holes or any type of outlet that allows gas into the chamber 4. Figure 2 appears to show some type of

connection between an arm 3 and the annular chamber 4 but it is ambiguous in what it shows.

Rhind only states that top 5a has a plurality of jet-apertures 5 for releasing the gas.

Applicant discloses a circularly-shaped burner tube that releases the gas for direct mixing with the air coming through the conical frusta for immediate burning. Rhind requires that the arms and ring deliver gas first to a chamber 4 defined by cylindrical wall 6 and inner cylindrical wall 7, then out through jet-apertures 5. Applicant does not require cylindrical walls 6, 7, an annular chamber 4, radial arms 3, or any of a number of other structural features disclosed and taught by Rhind. In fact, these features taught by Rhind have no utility and would be incompatible in Applicant's combustion system. Applicant's claimed structure is not disclosed, taught, or suggested at by Rhind.

As the Examiner well knows, the prior art must be considered in its entirety. By ignoring 75% of Rhind's aperture elements and other important structural elements, the Examiner has disregarded the fact that Rhind's complexity teaches directly away from Applicant's simple, yet highly effective, design. Accordingly, Rhind can neither anticipate nor make obvious Applicant's claims 1-11 and 19-26.

An advantage discussed in Applicant's disclosure is that the gas may be variably adjusted in Applicant's combustion system. Rhind does not mention anything about variably controlling the gas. Most importantly, Rhind does not suggest or even hint at anything similar to Applicant's simple yet effective design. Therefore, Rhind cannot make obvious Applicants' claims 1, 19, 25 and 26 (and all claims that depend therefrom).

Rhind states that a chimney seats upon the gallery 11 of his burner. In fact, Rhind

continually refers to top and bottom, upper and lower, and directing the air "horizontally against the flame" (see claim 1). Based on this language, it appears that Rhind's burner requires a vertical orientation. As illustrated in Applicant's drawings, the subject combustion system is designed for a portable heater, can be mounted horizontally or vertically, and does not require a chimney. There is no hint or suggestion that the burner disclosed in Rhind is portable, can be mounted horizontally, or can variably control the gas to be burned. Therefore, Rhind not only fails to disclose and/or suggest Applicant's claimed structure, it does not attain the various benefits of Applicants' invention. In view of the above, Applicant respectfully requests that the Examiner withdraw all rejections based on Rhind. It is important to note that Applicant has made minor amendments to certain claims in order to clarify the language or correct typographical errors. No amendments were made by Applicant as a result of art cited by the Examiner.

B. The Non-Art Matters

Applicant has amended claims 5 and 6 by changing "spiral-like" to "spiral-shaped." Again, these amendments were not made as a result of art cited by the Examiner.

With respect to the "sensor" mentioned on page 8, Applicant submits that its function is clearly described at the bottom of page 8 and the top of page 9. Further, the sensor is described, *inter alia*, on page 11, lines 10-18, and shown in Figure 6; in both of these places, the sensor is assigned reference numeral 37. Applicant has amended the specification at page 8, line 21, as set forth above, by inserting reference numeral 37.

The Examiner noted that reference numerals 76 and 90 were both used to identify the ignitor. Applicant has deleted reference numeral 76 on Figure 7 and renumbered it 90. Applicant submits herewith a copy of Figure 7, with the change in reference numeral marked in red, and requests the Examiner's authorization to permanently amend Figure 7 accordingly.

In the Office Action dated May 31, 2002, the Examiner failed to include a specific rejection for claims 10 and 11. Applicant was at a disadvantage in making arguments to support allowance of Claims 10 and 11 because of the Examiner's failure to include a specific rejection. Therefore, should the Examiner not allow all claims in the next Action, Applicant respectfully submits that the next action cannot be made final.

V. CONCLUSION

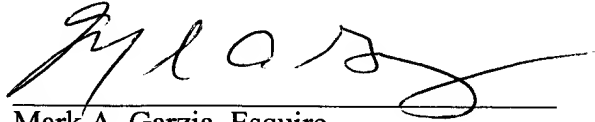
Rhind does not disclose or suggest Applicant's two conical frusta sections for controlling the air flow in a combustion system and, in particular, does not teach or even suggest a diverging conical frustum section. In addition, Rhind requires a number of structural features that are incompatible with and/or teach directly away from Applicant's claimed structure. Therefore, Rhind can neither anticipate or make obvious Applicant's claims 1-11 and 19-26.

Applicant respectfully requests reconsideration of this application in view of the above amendments and remarks, and the early issuance of a Notice of Allowance.

Respectfully submitted,

Date: 3 SEPTEMBER 2002

Enclosures



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CERTIFICATE OF MAILING

I hereby certify that this Reply to Office Action Pursuant to 37 CFR § 1.111, along with any paper or fee indicated as being enclosed, is being deposited with the United States Postal Service as First Class Mail, postage prepaid, and addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on September 3, 2002.

Date: 3 SEPTEMBER 2002


Mark A. Garzia



MARKED-UP CLAIMS PURSUANT TO 37 CFR § 1.121

1. (Once Amended) A combustion system for use in a gas burning heater, the combustion system comprising:

a circularly-shaped burner tube having a plurality of gas exit holes on one side and a means for feeding a controlled amount of gas thereto, said burner tube having a set diameter;

a first conical [frusta] frustum section having a pre-determined first pattern of orifice ports, the first conical [frusta] frustum section having a basal end having a diameter proximate the diameter of the burner tube and a smaller diameter distal end, the basal end of the first conical [frusta] frustum section being attached to the burner tube proximate said plurality of gas exit holes at a position radially inward from said gas exit holes; and

a second conical [frusta] frustum section having a pre-determined second pattern of orifice ports, said second conical [frusta] frustum section having a basal end and a larger diameter distal end, said basal end of the second conical [frusta] frustum section having a diameter proximate the diameter of the burner tube, said basal end of the second conical [frusta] frustum section attached to the burner tube proximate said plurality of gas exit holes at a position radially outward from said gas exit holes.

5. (Once Amended) The combustion system of claim 1 wherein said predetermined first pattern of orifice ports are arranged in a spiral-shaped [spiral-like] pattern.

6. (Once Amended) The combustion system of claim 5 wherein said predetermined second pattern of orifice ports are arranged in a spiral-like [spiral-shaped] pattern.



APPLN. NO. 09/852,445

ATTY. DKT.: TOPP-P2-US

MARKED-UP SPECIFICATION PURSUANT TO 37 CFR § 1.121

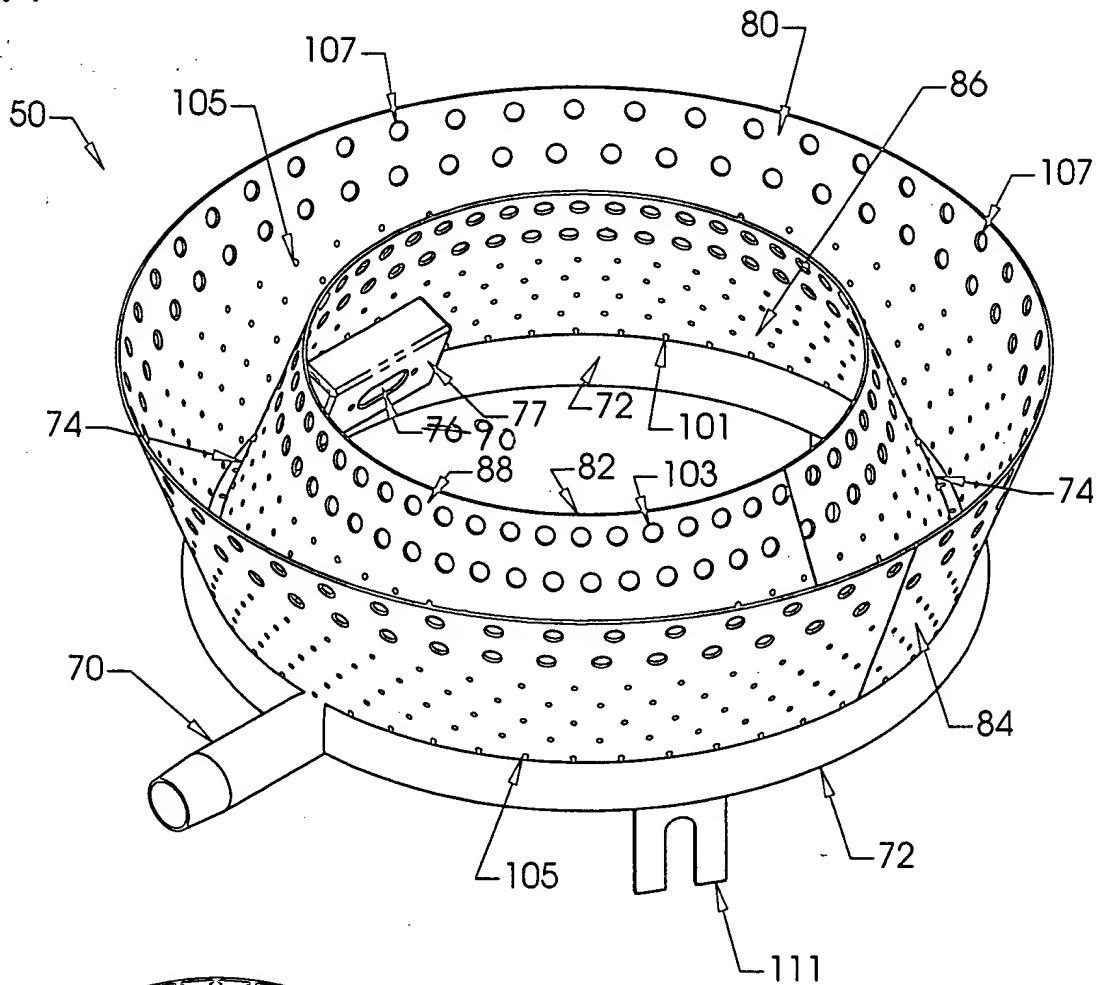
At page 8, lines 17-22, bridging over to page 9, lines 1-2:

Gas enters the combustion system 50 through tube 70 and eventually is relatively evenly distributed throughout ring-shaped burner tube 72. As gas leaves via gas exit holes 74 it is ignited by ignitor 90 [76]. After the gas is ignited, the control circuit ensures that a stream of gas exits gas holes 74, thereby ensuring that a flame is continuously lit at the combustion system 50.

A flame [The] sensor 37 can have dual functions, initially it can act as the ignition source and light or ignite the air/gas mixture to initiate proper combustion, and secondly it provides flame rectification thus signaling to the control circuit that there is proper combustion to the control circuit to maintain the gas valves open 54, 56 and discontinue the ignition source.

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FIG. 7



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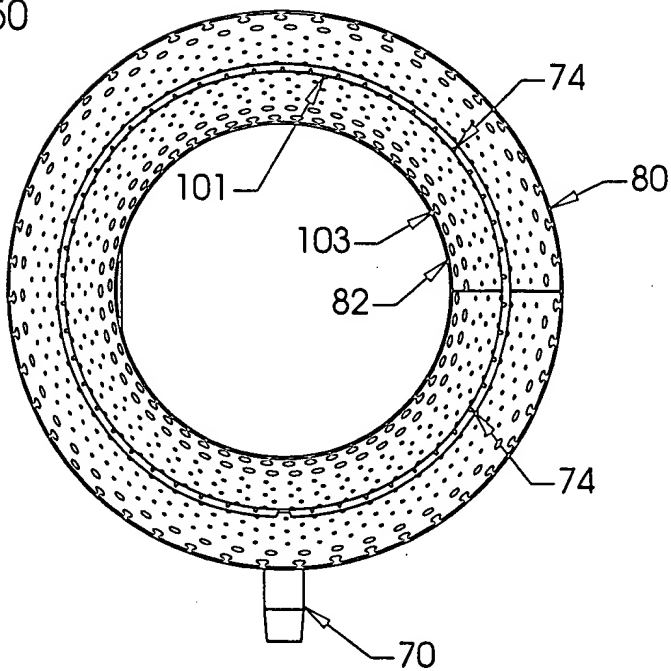


FIG. 8A